

CLAIMS

What is Claimed Is:

1 1. A mechanism controlling a voice coil, comprising:
 2 means for reducing a gain of a PES within a disk vibration frequency range; wherein said
 3 disk vibration frequency range includes frequencies between at least 1000 Herz and at most 3000
 4 Herz; and
 5 means for increasing said gain of said PES within a lower frequency range; wherein said
 6 lower frequency range includes frequencies between at least 16 Herz and at most 800 Herz;
 7 wherein said voice coil drives an actuator arm positioning a head gimbal assembly for a
 8 read-write head communicatively accessing a track on a rotating disk surface to generate said
 9 PES;
 10 wherein said PES is a function of said head gimbal assembly responding to mechanical
 11 vibrations in said rotating disk surface by providing said read-write head with radial motion
 12 toward said track.

1 2. The mechanism of Claim 1, wherein the means for increasing said gain of said
 2 PES further comprising:
 3 means for increasing a first of said gain of said PES within a first lower frequency range;
 4 and
 5 means for increasing a second of said gain of said PES within a second lower frequency
 6 range;
 7 wherein said first lower frequency range and said second lower frequency range both
 8 consist essentially of frequencies within said lower frequency range;
 9 wherein frequencies belonging to said first lower frequency range are smaller than said
 10 frequencies belonging to said second frequency range; and
 11 wherein said first gain is larger than said second gain.

3. The mechanism of Claim 2, wherein said second gain is between 0.9 and 1.1.

4. The mechanism of Claim 3, wherein said first gain is at least one and one half times said second gain.

5. The mechanism of Claim 4, wherein said first gain is at least two times said second gain.

6. A hard disk drive comprising: said controlling mechanism as in Claim 1; and said voice coil, said actuator arm, said head gimbal assembly with said read-write head, said rotating disk surface, and a channel interface generating said PES signal based upon said read-write head communicating with said rotating disk surface.

7. The mechanism of Claim 1, wherein said head gimbal assembly further comprising:

means for moving said slider parallel to said disk surface toward said track, when said disk surface is flat, by an actuator arm moving said slider by a lever action through a principal axis with said slider aligned at a bias angle;

means for radially moving said slider toward said track when said disk surface is bent, by said lever action through said principal axis at said bias angle causing said slider to move radially toward said track, when said disk surface is bent.

8. The mechanism of Claim 7, wherein the means for moving said slider parallel said disk surface further comprising means for said actuator arm moving, through a flexure, said slider mounted to said flexure at a second bias angle to said principal axis;

wherein the means for radially moving said slider further comprising: said flexure responding as said disk surface is bent, through said second bias angle, causing said slider to move radially toward said track.

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1 9. The mechanism of Claim 7, wherein the means for moving said slider parallel
2 said disk surface further comprising: means for moving said actuator arm by a level action
3 through a principal axis with said slider parallel said disk surface and flexibly mounted by a
4 flexure at a second bias angle to said actuator arm; and

5 wherein the means for radially moving said slider further comprising: means for said
6 flexure responding as said disk surface is bent through said second bias angle causing said slider
7 to radially move toward said track.

1 10. The mechanism of Claim 7, wherein said actuator arm is coupled to said load
2 beam via a first finger and a second finger; wherein said first finger flexes differently from said
3 second finger when said disk surface is bent; and

4 wherein the means for radially moving said slider further comprises said first finger
5 flexing differently from said second finger flexing to cause said slider moving radially toward
6 said track, when said disk surface is bent.

1 11. The mechanism of Claim 1, wherein at least one member of a reducing-increasing
2 means collection is implemented using at least one member of the collection comprising a finite
3 state machine, a computer, and a program step residing in a memory accessibly coupled to said
4 computer;

5 wherein said reducing-increasing means collection comprising
6 said means for reducing said gain of said PES within said disk vibration frequency range,
7 and
8 said means for increasing said gain of said PES within said lower frequency range.

1 12. A method of controlling a voice coil in a hard disk drive, comprising the steps of:
2 reducing a gain of a PES within a disk vibration frequency range; wherein said disk
3 vibration frequency range includes frequencies between at least 1000 Herz and at most 3000
4 Herz; and

5 increasing said gain of said PES within a lower frequency range; wherein said lower
6 frequency range includes frequencies between at least 20 Herz and at most 800 Herz;

7 wherein said voice coil drives an actuator arm positioning a head gimbal assembly for a
8 read-write head communicatively accessing a track on a rotating disk surface to generate said
9 PES; and

10 wherein said PES is a function of said head gimbal assembly responding to mechanical
11 vibrations in said rotating disk surface by providing said read-write head with radial motion
12 toward said track.

1 13. The method of Claim 12, wherein the step increasing said gain of said PES further
2 comprising the steps of:

3 increasing a first of said gain of said PES within a first lower frequency range; and

4 increasing a second of said gain of said PES within a second lower frequency range;

5 wherein said first lower frequency range and said second lower frequency range both
6 consist essentially of frequencies within said lower frequency range;

7 wherein frequencies belonging to said first lower frequency range are smaller than said
8 frequencies belonging to said second frequency range; and

9 wherein said first gain is larger than said second gain.

1 14. The method of Claim 13, wherein said second gain is between 0.9 and 1.1.

1 15. The method of Claim 14, wherein said first gain is at least one and one half times
2 said second gain.

1 16. The method of Claim 15, wherein said first gain is at least two times said second
2 gain.

1 17. A method making at least one member of the collection including a servo
2 controller and a hard disk drive, comprising the steps:

3 making said servo-controller as means for the steps of Claim 12; and
 4 making said hard disk drive using said servo-controller to control said voice coil driving
 5 said actuator arm coupled to said head gimbal assembly with said read-write head
 6 communicatively accessing tracks on said rotating disk surface in said hard disk drive.

1 18. Said servo-controller and said disk drive as products of Claim 17.

1 19. The method of Claim 12, wherein the step of said head gimbal assembly responding
 2 further comprising the steps of:

3 moving said slider parallel to said disk surface toward said track, when said disk surface
 4 is flat, by an actuator arm moving said slider by a lever action through a principal axis with said
 5 slider aligned at a bias angle; and

6 radially moving said slider toward said track when said disk surface is bent, by said lever
 7 action through said principal axis at said bias angle causing said slider to move radially toward
 8 said track, when said disk surface is bent.

1 20. The method of Claim 19, wherein the step moving said slider parallel said disk
 2 surface arm further comprising the step of: said actuator arm moving, through a flexure, said
 3 slider mounted to said flexure at a second bias angle to said principal axis;

4 wherein the step radially moving said slider further comprising the step of: said flexure
 5 responding as said disk surface is bent, through said second bias angle, causing said slider to
 6 move radially toward said track.

1 21. The method of Claim 19,

2 wherein the step moving said slider parallel said disk surface further comprising the step:
 3 moving said actuator arm by a level action through a principal axis with said slider parallel said
 4 disk surface and flexibly mounted by a flexure at a second bias angle to said actuator arm; and

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5 wherein the step radially moving said slider further comprising the step of said flexure
6 responding as said disk surface is bent through said second bias angle causing said slider to
7 radially move toward said track.

1 22. The method of Claim 19,

2 wherein said actuator arm is coupled to said load beam via a first finger and a second
3 finger; wherein said first finger flexes differently from said second finger when said disk surface
4 is bent; and

5 wherein the step radially moving said slider further comprising the step of said first
6 finger flexing differently from said second finger flexing to cause said slider moving radially
7 toward said track, when said disk surface is bent.